ÖGH Herpetozoa
Austrian Herpetological Society

Herpetozoa 33: 17–19 (2020)
DOI 10.3897/herpetozoa.33.e47317

First record of cannibalism in *Thamnodynastes phoenix* Franco, Trevine, Montingelli & Zaher, 2017 (Serpentes, Colubridae)

Mayara da Silva Ribeiro de Morais[1], Paula Fernanda de Araújo[2], Renato Magnum Tavares Costa[4], Frederico Gustavo Rodrigues França[4]

1 *Programa de Pós-Graduação em Zoologia, Universidade Estadual de Santa Cruz, 45662-000 Ilhéus, BA, Brazil*
2 *Graduação em Ecologia, Universidade Federal da Paraíba, Campus IV, 58297-000 Rio Tinto, PB, Brazil*
3 *Núcleo de Ecologia de Serpentes, Laboratório de Ecologia Animal, Departamento de Engenharia e Meio Ambiente, Universidade Federal da Paraíba, 58297-000 Rio Tinto, PB, Brazil*
4 *Departamento de Engenharia e Meio Ambiente, Universidade Federal da Paraíba, 58297-000 Rio Tinto, PB, Brazil*

http://zoobank.org/7B838E88-F424-4299-BA5F-FA1348F6D458

Corresponding author: *Mayara da Silva Ribeiro de Morais* (moraiis.mayara@gmail.com)

Academic editor: *Yurii Kornilev* ♦ **Received** 15 October 2019 ♦ **Accepted** 31 January 2020 ♦ **Published** 7 April 2020

Abstract

Cannibalism has been documented across many groups of snakes and the same is true for Brazilian snakes. Herein, we present the first observation of cannibalism in *Thamnodynastes phoenix* between two adult males from Caatinga biome of northeastern Brazil. We suggest this behavior could be influenced by a lack of resources caused by extreme abiotic conditions, as well as the opportunistic habits of this species.

Key Words

Brazil, Caatinga, diet, ecology, feeding habits, intraspecific predation, snake behavior

Cannibalism has been recognized as an important aspect in trophic ecology and it occurs in many animal species (mainly in captivity) despite being regarded as a maladaptive trait (Polis 1981). It may influence competitive interactions (for resources and mates), populations dynamics and behavior (Polis 1981; Polis and Myers 1985; Mitchell and Walls 2008). Cannibalism in reptiles occurs mostly in opportunistic foragers (Polis and Myers 1985). In snakes, besides the ophiophagous snakes, cannibalism has been documented in females that ingest their non-viable offspring and undeveloped eggs (Lourdais et al. 2005; Mociño-Deloya et al. 2009), between neonates and juveniles (Mienis 1986; Egler et al. 1996; Campbell and Lamar 2004) and in some adult individuals such as *Anilius scytale, Eunectes murinus, Helicops infrataeniatus* and *Siphlophis compressus* (Rivas and Owens 2000; Aguiar and Di-Bernardo 2004; Maschio et al. 2005; Alemu and Rowley 2008).

The genus *Thamnodynastes* comprises 20 species and occurs across South America (Bailey and Thomas 2007; Franco et al. 2017). In Brazil, 12 species are recognized and six of them can be found in the northern and northeast portion of Brazil (Franco et al. 2017). They are terrestrial and nocturnal snakes (Guedes et al. 2014), exhibiting viviparous reproduction that can live in a variety of habitats (Hamdan and Lira-da-Silva 2012). *Thamnodynastes phoenix* is associated with many types of Cerrado, but predominantly with the Caatinga formation of northeastern Brazil, from the state of Ceará to northern Minas Gerais (Franco et al. 2017).

Thamnodynastes snakes feed mainly on frogs (e.g. Bailey 1967; Bernarde et al. 2000; Bellini et al. 2013;

Copyright *Mayara da Silva Ribeiro de Morais et al.* This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Dorigo et al. 2014; Pergentino and Ribeiro 2017), but specific data on their diet are available only for a few species. Here we report the first record of cannibalism in natural conditions for *T. phoenix*.

On 28 June 2019 at 12:35 hrs we observed an adult male *T. phoenix* (52.2 cm SVL, 15.2 cm tail length, 65 g) swallowing, head first, another adult male (49.5 cm SVL, 13.6 cm tail length) (Fig. 1). The observation was made in Natuba, a Caatinga area of Paraíba State, Brazil (-7.5840375S; -35.598379W). At the moment of sighting, the prey's head was totally ingested; the individuals were collected forty-five minutes after that, when the prey was half eaten and the ingestion continued in a collection bag. The prey was completely ingested after one hour and there was no regurgitation. The snakes were on the ground in an open shrubby Caatinga, one of the most common phytophysiognomies of the biome (Santos and Santos 2008).

The individuals were taken to the Animal Ecology Lab in Universidade Federal da Paraíba, Rio Tinto municipality, Paraíba State, Brazil (UFPB). The predator was dissected for stomach content examination after being euthanized following the proposal by Lillywhite et al. (2016), fixed in 10% formalin and preserved in 70% alcohol. Both snakes were deposited in the Herpetological Collection of UFPB under collection numbers RF 446 and RF 447. Morphometric measurements were made with a digital caliper (precision 0.03 mm) and a standard ruler; weight was obtained using a Pesola spring scale (precision of 0.3 g). The snakes were collected under ICMBio/SISBIO permit no. 21799-1.

This observation was quite unexpected. *Thamnodynastes phoenix*, like the other species of the genus, is considered an anurophagous snake although its congeners diets are known to include lizards, rodents and fishes (Guedes et al. 2014; Franco et al. 2017). Ophiophagy was recorded in *T. strigatus* preying on *Sibynomorphus ventrimaculatus* (Ruffato et al. 2003). A female *T. rutilus* cannibalized a newborn baby (Araújo et al. 1998).

Cannibalism of adult individuals has never been reported in the genus *Thamnodynastes*. This behavior can be considered a strategy for demographic control (Castilla and Van Damme 1996) or an answer to starvation and

Figure 1. Cannibalistic behavior in *Thamnodynastes phoenix*.

stress in natural conditions (Göçmen et al. 2008). Furthermore, our record was made in a habitat considered the driest and with the lowest rainfall rate of the Caatinga biome, which leads to stress, scarcity and unpredictability of resources (Leal et al. 2003).

Our observation provides important addition to the knowledge of predator-prey relationships, especially considering the scarcity of data on snake diet from the semiarid regions of Brazil and particularly for the genus Thamnodynastes.

Acknowledgements

MSRM thanks the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for providing scholarships. We thank Rialma SA, represented by Igsson Chianca, for the logistic support and stimulus for data publication. FGRF thanks the CNPq for the financial support (Universal grant 404671/2016-0).

References

Aguiar LFS, Di-Bernardo M (2004) Diet and feeding behavior of *Helicops infrataeniatus* (Serpentes: Colubridae: Xenodontinae) in southern Brazil. Studies on Neotropical Fauna and Environment 39(1): 7–14. https://doi.org/10.1080/01650520412331270927

Alemu JB, Rowley JJL (2008) *Siphlophis compressus* (Red-eyed Liana Snake). Cannibalism. Herpetological Review 39(4): 472–473.

Araújo ME, Cotta GA, Assis VB (1998) Parturition and morphological aspects of *Thamnodynastes rutilus* (Serpentes: Colubridae). Revista Nordestina de Biologia 12(1/2): 75–82.

Bailey JR (1967) The synthetic approach to colubrid classification. Herpetologica 23: 155–161.

Bailey JR, Thomas RA (2007) A revision of the South American snake genus *Thamnodynastes* Wagler, 1830 (Serpentes: Colubridae, Tachymenini). II. Three new species from northern South America, with further descriptions of *Thamnodynastes gambotensis* Pérez-Santos and Moreno and *Thamnodynastes ramonriveroi* Manzanilla and Sánchez. Memoria de la Fundacion La Salle de Ciencias Naturales 166: 7–27.

Bellini GP, Armazendia V, Giraudo AR (2013) Ecology of *Thamnodynastes hypoconia* in subtropical-temperate South America. Herpetologica 69(1): 67–79. https://doi.org/10.1655/HERPETOLOGICA-D-12-00027

Bernarde PS, Moura-Leite JC, Machado RA, Kokubum MNC (2000) Diet of the colubrid snake, *Thamnodynastes strigatus* (Günther, 1858) from Paraná state, Brazil, with field notes on anuran predation. Brazilian Journal of Biology 60: 695–699. https://doi.org/10.1590/S0034-71082000000400022

Campbell JA, Lamar WW (2004) The Venomous Reptiles of the Western Hemisphere. Cornell University Press, Ithaca, New York.

Castilla AM, Van Damme R (1996) Cannibalistic propensities in the lizard *Podarcis hispanica atrata*. Copeia: 991–994. https://doi.org/10.2307/1447663

Dorigo TA, Vrcibradic D, Borges-Junior VNT, Rocha CFD (2014) New records of anuran predation by snakes of the genus *Thamnodynastes* Wagler, 1830 (Colubridae: Dipsadinae) in the Atlantic rainforest of southeastern Brazil. Herpetology Notes 7: 261–264.

Egler SG, Oliveira ME, Martins M (1996) *Bothrops atrox* (Common Lancehead). Foraging behaviour and ophiophagy. Herpetological Review 27 (1): 22–23.

Franco FL, Trevine VC, Montingelli GG, Zaher H (2017) A new species of *Thamnodynastes* from the open areas of central and northeastern Brazil (Serpentes: Dipsadidae: Tachymenini). Salamandra 53(3): 339–350.

Göçmen B, Werner YL, Elbeyli B (2008) Cannibalism in *Dolichophis jugularis* (Serpentes: Colubridae): More than random? Current Herpetology 27(1): 1–7. https://doi.org/10.3105/1345-5834(2008)27[1:CIDJSC]2.0.CO;2

Guedes TB, Nogueira C, Marques OVA (2014) Diversity, natural history, and geographic distribution of snakes in the Caatinga, northeastern Brazil. Zootaxa 3863: 1–93. https://doi.org/10.11646/zootaxa.3863.1.1

Hamdan B, Lira-da-Silva RM (2012) The snakes of Bahia State, northeastern Brazil: Species richness, composition and biogeographical notes. Salamandra 48: 31–50.

Leal IR, Tabarelli M, Silva JMC (2003) Ecologia e Conservação da Caatinga. Ed. Universitária da UFPE, Recife.

Lillywhite HB, Shine R, Jacobson E, Denardo DF, Gordon MS, Navas CA, Heard D (2016) Anesthesia and euthanasia of amphibians and reptiles used in scientific research: Should hypothermia and freezing be prohibited? Bioscience 67(1): 53–61. https://doi.org/10.1093/biosci/biw143

Lourdais O, Brischoux F, Shine R, Bonnet X (2005) Adaptive maternal cannibalism in snakes (*Epicrates cenchria maurus*, Boidae). Biological Journal of the Linnean Society 84: 767–774. https://doi.org/10.1111/j.1095-8312.2005.00436.x

Maschio GF, Lima AC, Prudente ALC (2005) *Anilius scytale* (Red Pipesnakes). Cannibalism. Herpetological Review 36(2): 187–187.

Mienis HK (1986) Cannibalism in a juvenile Large Whip Snake, *Coluber jugularis asianus*, in Israel. Zoology in the Middle East 1: 88–90. https://doi.org/10.1080/09397140.1986.10637521

Mitchell JC, Walls SC (2008) Population dynamics: Cannibalism. In: Jørgensen SE, Fath B (Eds) Encyclopedia of Ecology. Elsevier, Amsterdam, 513–517. https://doi.org/10.1016/B978-008045405-4.00641-8

Mociño-Deloya E, Setser K, Pleguezuelos JM, Kardon A, Lazcano D (2009) Cannibalism of nonviable offspring by postparturient Mexican lance-headed rattlesnakes, *Crotalus polystictus*. Animal Behaviour 77: 145–150. https://doi.org/10.1016/j.anbehav.2008.09.020

Pergentino HE, Ribeiro LB (2017) Anurophagy by the snake *Thamnodynastes phoenix* (Squamata: Dipsadidae: Tachymenini) in dry forested areas of northeastern Brazil. Herpetology Notes 10: 597–600.

Polis GA (1981) The Evolution and dynamics of intraspecific predation. Annual Review of Ecology and Systematics 12: 225–251. https://doi.org/10.1146/annurev.es.12.110181.001301

Polis GA, Myers CA (1985) A survey of intraspecific predation among reptiles and amphibians. Journal of Herpetology 19(1): 99–107. https://doi.org/10.2307/1564425

Rivas JA, Owens RY (2000) *Eunectes murinus* (Green anaconda). Cannibalism. Herpetological Review 31(1): 44–45.

Ruffato R, Di-Bernardo M, Maschio GF (2003) Dieta de *Thamnodynastes strigatus* (Serpentes, Colubridae) no sul do Brasil. Phyllomedusa 2(1): 27–34. https://doi.org/10.11606/issn.2316-9079.v2i1p27-34

Santos AMDM, Santos BA (2008) Are the vegetation structure and composition of the shrubby Caatinga free from edge influence? Acta Botanica Brasilica 22(4): 1077–1084. https://doi.org/10.1590/S0102-33062008000400018